Original article

Correlation between health status of mother and birth weight of baby at term

J. Biswas[1], N. Sultana[2], MK Sarkar[3], S Akhtar[4], KM Begum[5], F Dewan[6]

Abstract

Objective : Nutrition plays a major role in maternal and child health. Poor maternal health status has been related to adverse birth outcome is complex and is influenced by many biologic, socio-economic and demographic factors. This study was done to evaluate the maternal nutritional status and growth status of a baby, which further related to mortality, morbidity, and disability in neonates, infancy and childhood and has long term impact in health outcome in adult.

Methods : This observational cross sectional study was conducted in the Department of Obstetrics and Gynecology of Shaheed Suhrawardy Medical College and Hospital from July, 2012 to December, 2012. A total 168 patients of pregnant women admitted in hospital for delivery at term were enrolled in this study according to case definition. After enrolment, the patients were thoroughly assessed with particular emphasis on the anthropometric measurements. Weight, Height, BMI and Hb% of mother and birth weight of baby at term were measured and recorded in a pretested semi structured questionnaire. Results were compared between maternal health status and birth weight and For analytical test the level of significance is 0.05 & p-value <0.05 will be considered significant.

Results : Half of the LBW neonates were born to the mothers whose BMI was <18.5. On the other hand 17% LBW neonates were born to the mothers whose BMI was >18.5. That is the lower the maternal BMI; the greater is the risk of producing LBW babies. Over 41% LBW neonates were born to the mothers whose HB% was <10 gm./dl. On the other hand 9.8% LBW neonates were born to the mothers whose HB% was >10 gm./dl. It shows that anemic mothers have greater risk of producing LBW babies.

Conclusion : The study concluded that maternal health status influence neonatal outcome.

Key words : nutritional status, LBW.

Introduction

Human reproduction is a complex social, biochemical & physical process that is not as successful as once through.There are several factors in mother influencing fetus or neonate. The risk factors related to neonatal nutritional status should be assessed in mother to reduce potential neonatal risks. The factors vary from once region to another & from one country to another, depending on the socio-economic condition & environment[1]. Bangladesh is one of the least developed countries where especially low-birth weight babies & youngsters are the ignorance & malnutrition are wide spread problem, main victims of malnutrition. Birth weight is an indicator of the health status of the country. It is the most inter-determinants of the chances of newborn to survive & continue healthy neonates & overall future development. LBW is a general indication of the health status of a population.

It is universally acknowledged medical truth that adequate nutrition before & during pregnancy has greater potential for a long term health of both mother & the child & it is important during the course of pregnancy. A woman who has been well-nourished before conception begins her pregnancy with reserves of several nutrients, so that the recurrent needs of growing fetus can be met without adversely affecting her health. Infant who have been well nourished in the womb, have an enhanced chance of entering life in very good health. Mother's diet should provide adequate nutrients, so that maternal stores do not get depleted.

The crucial recommendation to such pregnant women in India is to consume a balanced diet as described by the

1. Assistant Professor, Gynae and Obs. Ad-Din Women's Medical College & Hospital, Moghbazar, Dhaka.
2. Registrar, Gynae and Obs., Ad-Din Women's Medical College & Hospital, Moghbazar, Dhaka.
3. Trainee Officer, Armed Forces Institute of Pathology, Dhaka Cantonment, Dhaka.
4. Registrar,,Ad-Din Women's Medical College & Hospital, Moghbazar, Dhaka.
5. Assistant Professor, Gynae and Obs. Ad-Din Women's Medical College & Hospital, Moghbazar, Dhaka.
6. Professor and Head. Department of Obstetrics & Gynecology Shaheed Suhrawardy Medical College & Hospital, Dhaka.

Correspondence : Dr. Jhuma Biswas,
E-mail : jhummalika25@gmail.com

Indian council4 of medical research which includes extra-nutrients for pregnancy, lactation & childhood. Poor fetal growth has been distributed to wide-spread maternal under-nutrition. Maternal nutrition is an important factor responsible not only for health of baby, but also for the baby's long term growth. Therefore understanding maternal nutrition & fetal growth relationship is critical.

Maternal health status is defined on the basis of weight for height, skin fold thickness of the arm, mid-upper arm circumference and the hemoglobin level in the blood Anthropometry provides a simple, reliable and low cost method of assessing maternal health status, which can be universally applied at the primary care level by low skilled workers in the community.

LBW is defined in the 29th World Health Assembly (WHA)6 in 1976 as a birth weight less than 2500gm.There are in fact only two ways in which birth weight can be influenced. One is the length of the time the fetus remains in utero & the other is the fetal growth rate.

It has been estimated by WHO that at least 57.9/1000 live birth. This rate is higher in Black is about 116/1000 live birth in relation to White is about 45.7/1000 live birth6. Rates of LBW, MLBW, and VLBW are lowest for mothers 25–29 years of age and increase with increasing and decreasing" age most of them developing countries[6]. A Common theme **well nourished in the womb, have an enhanced chance of entering life in very good health. Mother's diet should provide adequate nutrients, so that maternal stores do not get depleted**.

throughout the study is the substantial and persistent difference between black and white babies in the risk of low birth weight. In 1975, black babies were 2, 1 times as likely as white babies to have a birth weight of less than 2,500 grams. Low birth weight declined more for white than for black births in the 1975–85 period, increasing the racial deferential to 2.2: 'It remained at this level .in 1986 and 1987[6].

There is lack of adequate information regarding the risk factors of LBW in Bangladesh. In many developing countries like Pakistan, India, Malaysia & Thailand maternal nutrition, lack of education, ignorance, physical labor during late pregnancy & poor economic status have been identified as the determinants of LBW. As Bangladesh has similar socio-economic condition, culture & environment it could be assumed that the same risk factors could have an impact on birth weight. Therefore it is an urgent need to explore the risk factors for LBW to reduce perinatal mortality & morbidity. Considering these the present study has been designed to assess maternal health factors influencing neonatal outcome. Although this hospital based study will not be able to provide the situation of LBW of the nation at large. However the results can be utilized.

Materials and Methods

Study design, place and period : This observational cross sectional study was carried in Shaheed Suhrawardy Medical College and Hospital during July 2012 to December,2012.

Study Population : The study was carried out among the pregnant women admitted in the in-patient Department of Obstetrics and Gynecology in selected hospital at term.

Case Definitions

(A) BMI:BMI[3] is calculated by W/m^2, here W= weight in kg and m= height in meter.
Cut off point for pregnancy:
Normal:19.8 to 26 kg/m2 Low:<19.8 kg/m2
High:26.1 to 29 kg/m2 Very High: >29 kg/m2

(B) LBW : Less than 2500gm3
(C) Anaemia : Hb level at or below 9 gm./dl at any time during pregnancy3

Selection of cases

Inclusion criteria: All the pregnant women (except those who had the following exclusion criteria) admitted delivery at term.

Exclusion criteria : (a) The pregnant women suffering from hypertension, pre-eclampsia, diabetes, Thyroid dysfunction, & nephritis. (b) Major congenital anomaly of the fetus. (c) Multiple pregnancies.

Sample size and sampling : The samples are selected purposively based on the inclusion exclusion criteria from Shaheed Suhrawardy Medical College and Hospital during July2012 to December 2012. A total 168 cases were selected.

Data Collection : Data was collected by face-to-face interview using a semi-structured questionnaire. Data

along with maternal and newborn anthropometry was collected from the respondents directly. A valid & reliable neonatal weighing machine was used for measuring neonatal birth weight. Maternal BMI was calculated by using the following formula: BMI = W/m2 Here, W = weight in kg, m = height in meter.Maternal blood sample was collected for assessing hemoglobin estimation in gm./dl.

Statistical analysis : was performed using SPSS version 11.01. For analytical test the level of significance is 0.05 & p-value <0.05 will be considered significant.

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Results

In this study analysis of several factors influencing neonatal outcome was done. It showed that maternal Weight, Height, BMI &Hb% had an influence on neonatal outcome. Among 165 women majority of women were ≥ 150cm in height. Almost 31.42% LBW neonates were born to mothers height <150cm, average birth weight 2.5±0.7(mean±SD) and where as 15.78% neonates were born to mothers height ≥150cm, average birth weight was 3.2±.9(mean±SD).this shows that the lower the maternal height, greater is the incidence of LBW. This findings is strongly significant (p<0.0005).

Majority (36%) of women were between 50-55 kg in weight.34.88% LBW were born to mothers whose weight was <50kg and average birth weight was 2.1±.5 (mean±SD).On the other hand 18.03% LBW neonates were born to mother of average weight i.e. 50-55 kg and average birth weight was 2.8±.4.So lower the maternal weight, greater is the incidence of LBW.

Table-I

Correlation between mater nal height & birth weight of neonates

Maternal Height (cm)	Birth Weight (kg) <2.5 n(%)	2.5-3.9 n(%)	≥ 4 n(%)	Mean weight (kg) ± SD
<150	11(31.42%)	22(62.85%)	2(5.71%)	2.5 ±0.7
≥150	21(15.78%)	107(80.45%)	5(3.75%)	3.2 ± 0.9

Table -II

Correlation between maternal weight & birth weight of neonates

Maternal Weight (kg)	Birth Weight (kg) <2.5 n(%)	2.5-3.9 n(%)	≥ 4 n(%)	Mean weight (kg) ± SD
<50	15(34.88%)	28(65.11%)	0(0%)	2.1 ± 0.5
50-55	11(18.03%)	48(78.68%)	2(3.27%)	2.8 ± 0.4
56-60	4(7.69%)	45(86.53%)	3(5.76%)	3.1 ± 0.6
>60	2(16.66%)	8(66.66%)	2(16.66%)	3.2 ± 0.4

Table –III

Correlation between maternal BMI & birth weight of neonates

Maternal BMI (kg/m2)	Birth Weight (kg) <2.5 n(%)	2.5-3.9 n(%)	≥ 4 n(%)	Mean weight (kg) ± SD
Low	11(64.70%)	6(35.29%)	0(0%)	2 ± 0.3
Normal	17(13.82%)	104(84.55%)	2(1.62%)	2.9 ±0.6
High	3(13.63%)	17(77.27%)	2(9.09%)	3.3 ±0.5
Very high	1(16.66%)	2(33.33%)	3(50%)	3.4 ± 0.4

Table-IV

Distribution of neonates by birth weight and maternal hemoglobin

Maternal Hb (g/dl)	Birth Weight (kg) <2.5 n(%)	2.5-3.9 n(%)	≥ 4 n(%)	Mean weight (kg) ± SD
<7	1(100%)	0(0%)	0(0%)	2.1 ±0.4
7-7.9	2(50%)	2(50%)	0(0%)	2.5 ±0.5
8-8.9	9(19.56%)	34(73.91%)	(6.52%)	2.9 ±0.3

This findings is statistically significant (p<0.003).

The lowest maternal BMI was 16 and maximum was 53. Majority of the mothers were of average BMI 64.70%. LBW neonates were born to mothers whose BMI was low. On the other hand 13.82% LBW neonates were born to the mothers whose BMI was normal. That is the lower the maternal BMI; the greater is the risk of producing LBW babies. The finding is statistically strongly significant (p<0.01).

100% LBW neonates were born to the mothers whose Hb% was <7gm/dl. On the other 17.09% LBW neonates were born to mothers whose Hb% was ≥10 g/dl. It shows that anaemic mothers have greater risk of producing LBW babies. The finding is statistically strongly significant. (p< 0.05).

Discussion

This hospital-based study was carried out to assess the nutritional status of pregnant women by measuring weight, height, BMI and Hb% and to assess the pregnancy outcome by measuring birth weight of newborn. To get accurate information about the factors influencing neonatal outcome a community-based study was needed which could reveal a real picture. However this study provided information of a hospital setting. BMI is usually used as a parameter for non pregnant women. Here we received the mothers in pregnant state; so to minimize the inaccuracy anthropometric measurements were done on the day after delivery. Neonatal well being largely depends on its birth weight and other anthropometric measurements. Therefore it is suggested that to assess the neonatal outcome of a term baby birth weight should be considered. In this study an analysis of several factors influencing neonatal outcome was done. It showed that maternal Weight, Height, BMI and Hb% had an influence on **neonatal outcome. Various studies** were conducted in **many countries** about the incidence and factors related with low birth weight. The major and lowest birth weights were reported for Asia5.According to the demographic and health survey, UNICEF (1998-2002), 30% low birth weight babies are born in Bangladesh, 21% in Nepal and 22% in Srilanka[5]. This indicates the poorest condition of birth weight in Bangladesh among these countries. In the present study, LBW was found 19.5%, which is similar to the finding of Karim E.(1996)[2]. He found LBW 20.6% in a longitudinal anthropo metr ic study of mother-infant pair from Dhaka. The percentage of LBW in the present study is not consistent with that of UNICEF (1998-2002) as because the study is hospital based and the study population who sought medical care was restricted within the middle class and affluent society.Although, in this study the birth weight were differed, because maternal nutritional status influence more on birth weight than other anthropometric measurements of the infant. In this study highest percentage of LBW babies were found among the teen-aged mothers and with the increase of maternal age birth weight of their babies increased.

The study showed that proportion of LBW was observed among the mothers who have short stature, under-weight. This indicates poor health status of mothers significantly influence outcome of pregnancy.

Present study also showed that the lower the maternal BMI, the greater is the tendency of producing LBW babies. Karim3 study was consistent with this study; he found LBW of the neonates among the mothers of low BMI, which was also statistically significant.

In this study mean hemoglobin percentage of mothers was found 10.4 gm./dl sd±1.1. Majority of LBW neonates were born to the mothers whose Hb% was <10 gm./dl. On the other hand neonates of average andlarge for gestational babies were born to the mothers whose Hb% ≥10 gm./dl.

Limitation of the study

ShSMCH is one of the biggest referral hospitals in the country in respect of obstetrics. The majority of the patients admitted here are from the surrounding areas; rests are from nearby Dhaka city. The limitation of this study was that the sample size was small and it was done only at ShSMCH, so the results should not represent the real situation of Bangladesh. However most of the results are quite similar with that of other studies conducted in Bangladesh or similar socio-economic countries.

Conclusion

It was noticed that mothers with under weight had higher proportion of LBW babies. Maternal BMI was found to affect the growth of neonate. Influences of maternal age, parity gestational age were also seen on the birth weight.

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